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Subject: Summary of Geophysical Survey at Sanyo Site


Dear Ms. Hart:

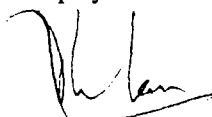
WESTON is pleased to submit the results of the geophysical survey at the Sanyo site. The survey was performed by Mr. Glenn Brooks of WESTON during the second week in July 1992 using a specially designed magnetometer rented from Scintrex, USA.

If you have any questions or require clarification, please call.

Very truly yours,

ROY F. WESTON, INC.


For Glenn A. Brooks
Geophysicist


P. Krishnan, Ph.D., P.E.
Site Manager

GAB:PK:jcj

cc: S. Nathan, Project Manager, U.S. EPA, HSM-5J (letter only)

**GEOPHYSICAL SURVEY
SANYO E&E CORPORATION
RICHMOND, INDIANA**

INTRODUCTION

WESTON was authorized by U.S. EPA Region V to complete nonintrusive geophysical survey at the Sanyo site (Sanyo). This site is located in Richmond, Indiana. The geophysical survey was mainly to detect potentially unexploded ordnances in areas from which soil samples are proposed to be collected at a depth of up to three feet vertically.

The nonintrusive geophysical survey recorded subsurface signals from zero to thirty feet vertically. The geophysical survey was completed with a magnetometer specifically designed for detection of unexploded ordnances which are housed in metallic jackets. The instrument is a portable cesium magnetometer commercially available from Scintrex, USA. A brief description of the magnetometer, and the data interpretation is discussed in the following sections.

Portable Cesium Magnetometer

The Scintrex portable cesium magnetometer system is a high-sensitivity, magnetic field measuring instrument designed for magnetic search and geophysical ground survey operations.

The portable, lightweight sensor generates a larmor frequency that is directly proportional to the absolute value of the local magnetic field at the sensor head. The signal console is connected to the sensor by a single coaxial cable and digitally displays the measured field strength in units of gammas. An audio signal that is directly proportional in frequency to the measured field is heard over an internal speaker or, alternatively, over the accessory headphones.

Cesium (Cs) is a chemical element in the group IA of the periodic table, the alkali metal group, and the first element to be discovered spectroscopically. Cesium is naturally occurring. The name was derived from the unique blue lines of its spectrum. Cesium is silvery white, very reactive, and softest of all metals. It is liquid in a warm room. Cesium reacts explosively with water and it readily combines with oxygen, so that it is used in electron tubes as a gatherer to displace the traces of oxygen and other gases trapped in the tube when sealed. Because cesium is strongly photoelectric, it is used extensively in photoelectric cells and in television cameras to form the electronic image.

The sensor consists of two parts: the sensor head and its electronics connected by a staff or cable assembly. The cesium sensor is an oscillator which produces a frequency that is directly proportional to the total field intensity. The proportionality constant is approximately 3.4986 hz per gamma. Over the specified operating range of the instrument,

which was designed for the naturally-occurring intensity of the earth's magnetic field at the surface, the output frequency will vary from 69,972 hz (20,000 gammas) to 349,865 hz (100,000 gammas).

In order for the sensor to operate correctly, the positive direction of the sensor head must be aligned at approximately 45° plus or minus 30° with respect to the direction of the local magnetic field. When the sensor is oriented in this way, it is said to be in its active zone.

The magnetic field of the earth is oriented upward from the ground in the southern hemisphere and points down again in the north. To keep the magnetic field in the active zone of the sensor head it would be necessary to point the positive direction of the head upward in the south and downward in the north.

Field Procedures

Magnetic gradient surveys were completed over three areas of property at the Sanyo site to include landfill, bunker, and background.

The proposed soil sampling at the site requires two samples to be collected from the landfill. Prior to data acquisition, the magnetometer was oriented properly and the audio was tuned for the landfill. For sensor orientation, optimum calibrations were obtained by facing north and moving the sensor slowly from the vertical down toward horizontal in the north/south plane. A successful orientation is indicated by an extinguishment of the signal low indicator and the digital readout shows a fairly steady reading. These steady readings were compared with the magnetic field intensity of the north-central Midwestern region of the United States. The magnetic field for the north-central Midwestern region of the United States is approximately 56200 to 56550 gammas.

When audio tune is achieved the indicator on the console will be extinguished by turning the control clockwise. Optimum tuning is characterized by an increasing magnetic field reading with a proportional increasing frequency.

When the proper procedures for calibration have been followed the digital readout on the console should be stable in an environment free of man-made metallic bodies. Furthermore, in a area free of man-made interference on a geomagnetically quiet day the indicated measurements should vary by a few tenths of gammas at most. This stability was tested by moving the sensor proximal to an abandoned railroad system.

The measurements were displayed automatically and continuously by the readout when the selected areas were swept. The magnetic survey around each area of proposed soil sampling has a minimum radius of approximately 10 feet.

Geophysical Data and Their Interpretation

WESTON completed these surveys with a portable cesium optically pumped magnetometer. The purpose of the magnetic surveys was to ascertain ordnance clearance of selected areas proposed for soil samplings. A listing of magnetic data recorded over the area of proposed soil sampling is shown in Table 1. Figure 1 shows the approximate locations for the soil samples.

The listings of the magnetic data are entitled Parcels 1 to 9. Parcels 1 to 4 are located over the abandoned landfill area. Parcels 5 to 6 are located over the abandoned bunker area. Parcels 7 to 9 are located in the background areas.

The magnetic field over the north-central Midwestern United States range between 56200 to 56550 gammas and the magnetometer was calibrated to these values. When the magnetometer is passed over an object which causes a disturbance in the earth's magnetic field, the audit responses would change significantly. As shown in Table 1, the values recorded at the Sanyo site ranged between the 56498 to 56516 gammas. These values are within the limits of the total magnetic field for the north-central Midwestern United States and are, therefore, interpreted as background magnetic field data.

The cesium magnetometer was calibrated several times during the survey. In addition, the magnetometer was brought near ferrous targets in order to test the integrity of magnetic signal.

Summary

WESTON completed magnetic surveys at the Sanyo site to identify the presence of buried ordnance in areas where soil samples will be collected. The magnetometer used at the Sanyo site is a specially designed magnetometer for ordnance detection available from Scintrex, USA. The portable cesium magnetometer system is a high-sensitivity, magnetic field measuring instrument designed for magnetic search and geophysical ground survey operations. The portable, lightweight sensor generates a larmor frequency that is directly proportional to the absolute value of the local magnetic field at the sensor head.

The instrument was calibrated for the magnetic field for the north-central Midwestern United States and is approximately 56200 to 56550 gammas. Nine parcels of areas within the approximate limits of proposed soil sampling locations were surveyed. Interpretation of data indicates that the areas surveyed are free of unexploded ordnance.

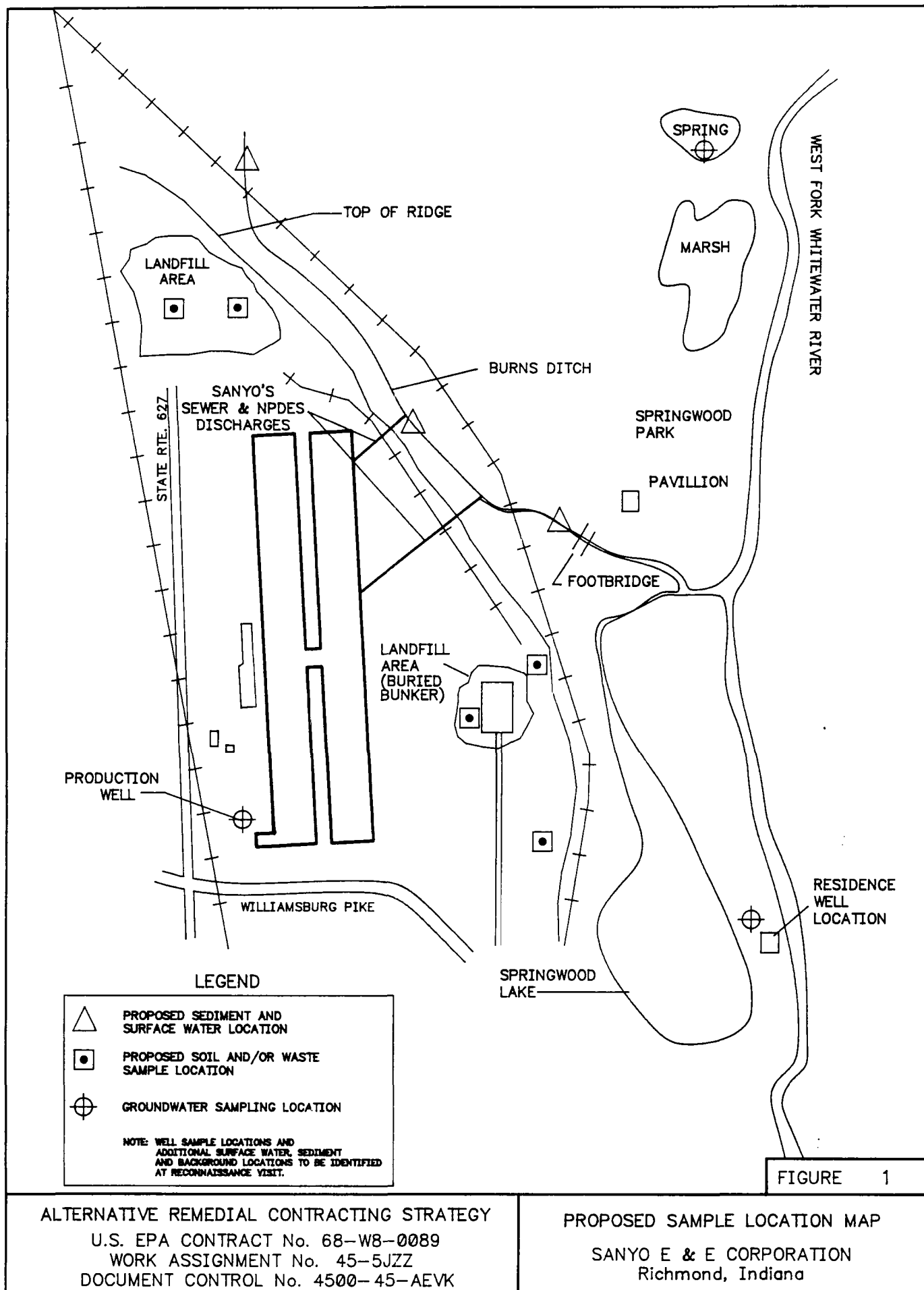


Table 1

Gammas

Nos.	Parcel 1	Parcel 2	Parcel 3	Parcel 4	Parcel 5	Parcel 6	Parcel 7	Parcel 8	Parcel 9
1	56500	56503	56509	56502	56500	56506	56504	56500	56501
2	56500	56504	56509	56500	56502	56504	56498	56500	56501
3	56500	56504	46400	46403	46403	46400	46403	56502	56501
4	56505	56503	56511	56500	56506	56500	56500	56501	56504
5	56500	56500	56513	56503	56507	56500	56500	56502	56504
6	56500	56516	56505	56500	56505	56500	56504	56500	56500
7	56500	56500	56500	56501	56505	56502	56504	56500	56504
8	56501	56500	56498	56501	56505	56501	56507	56502	56504
9	56503	56500	56501	56500	56504	56501	56506	56501	56502
10	56500	56502	56500	56500	56500	56500	56503	56500	56500
11	56502	56500	56550	56500	56505	56504	56500	56500	56500
12	56500	56504	56500	56500	56500	56500	56500	56500	56499
13	56500	56500	56500	56511	56502	56503	56499	56504	56500
14	56500	56503	56500	56513	56500	56500	56502	56504	56500
15	56500	56500	56501	56505	56503	56500	56500	56500	56504
16	56500	56501	56504	56500	56500	56500	56500	56503	56504
17	56502	56501	56504	56498	56501	56504	56500	56503	56502
18	56500	56500	56503	56501	56505	56503	56501	56500	56503
19	56504	56500	56500	56500	56505	56501	56501	56500	56500
20	56500	56500	56516				56504		